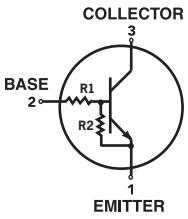
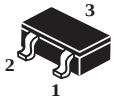
WEITRON

MUN2211 Series

NPN Silicon Bias Resistor Transistor

Lead(Pb)-Free





SC-59

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	50	Vdc
Collector-Base Voltage	V_{CBO}	50	Vdc
Collector Current-Continuous	I_C	100	mAdc

THERMAL CHARACTERISTICS

Characteristics	Symbol	Max	Unit
Total Device Dissipation FR-5 Board (1) TA=25 °C Derate above 25 °C	P_D	230 1.8	mW mW/°C
Thermal Resistance, Junction to Ambient(1)	$R_{\theta JA}$	540	°C/W
Junction and Storage, Temperature	$T_{J,Tstg}$	-55 to +150	°C

1. FR-4 @ minimum pad

Device Marking and Resistor Values

Device	Marking	R1(K)	R2(K)	Device	Marking	R1(K)	R2(K)
MUN2211	8A	10	10	MUN2232	8J	4.7	4.7
MUN2212	8B	22	22	MUN2233	8K	4.7	47
MUN2213	8C	47	47	MUN2234	8L	22	47
MUN2214	8D	10	47	MUN2236	8N	100	100
MUN2215	8E	10	∞	MUN2237	8P	47	22
MUN2216	8F	4.7	∞	MUN2240	8T	47	∞
MUN2230	8G	1.0	1.0	MUN2241	8U	100	∞
MUN2231	8H	2.2	2.2				

ELECTRICALCHARACTERISTICS (T_A = 25 °C unless otherwise noted)

Characteristic		Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Collector-Base Cutoff Current (V_{CB} = 50 V, I_E = 0)		I_{CBO}	-	-	100	nAdc
Collector-Emitter Cutoff Current (V_{CE} = 50 V, I_B = 0)		I_{CEO}	-	-	500	nAdc
Emitter-Base Cutoff Current	MUN2211	I_{EBO}	-	-	0.5	mAdc
(V_{EB} = 6.0 V, I_C = 0)	MUN2212		-	-	0.2	
	MUN2213		-	-	0.1	
	MUN2214		-	-	0.2	
	MUN2215		-	-	0.9	
	MUN2216		-	-	1.9	
	MUN2230		-	-	4.3	
	MUN2231		-	-	2.3	
	MUN2232		-	-	1.5	
	MUN2233		-	-	0.18	
	MUN2234		-	-	0.13	
	MUN2236		-	-	0.05	
	MUN2237		-	-	0.13	
	MUN2240		-	-	0.2	
	MUN2241		-	-	0.1	
Collector-Base Breakdown Voltage (I_C = 10 uA, I_E = 0)		$V_{(BR)CBO}$	50	-	-	Vdc
Collector-Emitter Breakdown Voltage (1) (I_C = 2.0 mA, I_B = 0)		$V_{(BR)CEO}$	50	-	-	Vdc
ON CHARACTERISTICS (1)						
DC Current Gain	MUN2211	h_{FE}	35	60	-	
(V_{CE} = 10 V, I_C = 5.0 mA)	MUN2212		60	100	-	
	MUN2213		80	140	-	
	MUN2214		80	140	-	
	MUN2215		160	350	-	
	MUN2216		160	350	-	
	MUN2230		3.0	5.0	-	
	MUN2231		8.0	15	-	
	MUN2232		15	30	-	
	MUN2233		80	200	-	
	MUN2234		80	150	-	
	MUN2236		80	150	-	
	MUN2237		80	140	-	
	MUN2240		160	350	-	
	MUN2241		160	350	-	
Collector-Emitter Saturation Voltage (I_C = 10 mA, I_B = 0.3 mA) (I_C = 10 mA, I_B = 5 mA) MUN2230/MUN2231 (I_C = 10 mA, I_B = 1 mA) MUN2215/MUN2216 MUN2232/MUN2233/MUN2234		$V_{CE(sat)}$	-	-	0.25	Vdc
Output Voltage (on)		V_{OL}				Vdc
(V_{CC} = 5.0 V, V_B = 2.5 V, R_L = 1.0 kΩ)	MUN2211		-	-	0.2	
	MUN2212		-	-	0.2	
	MUN2214		-	-	0.2	
	MUN2215		-	-	0.2	
	MUN2216		-	-	0.2	
	MUN2230		-	-	0.2	
	MUN2231		-	-	0.2	
	MUN2232		-	-	0.2	
	MUN2233		-	-	0.2	
	MUN2234		-	-	0.2	
(V_{CC} = 5.0 V, V_B = 3.5 V, R_L = 1.0 kΩ)	MUN2213		-	-	0.2	
	MUN2240		-	-	0.2	
(V_{CC} = 5.0 V, V_B = 5.5 V, R_L = 1.0 kΩ)	MUN2236		-	-	0.2	
(V_{CC} = 5.0 V, V_B = 4.0 V, R_L = 1.0 kΩ)	MUN2237		-	-	0.2	
(V_{CC} = 5.0 V, V_B = 5.0 V, R_L = 1.0 kΩ)	MUN2241		-	-	0.2	

ELECTRICALCHARACTERISTICS (T_A = 25 ℃ unless otherwise noted) (Continued)

Characteristic		Symbol	Min	Typ	Max	Unit
ON CHARACTERISTICS (Note 1) (Continued)						
Output Voltage (off) (V_{CC} = 5.0 V , V_B = 0.5 V , R_L = 1.0 kΩ) (V_{CC} = 5.0 V , V_B = 0.050 V , R_L = 1.0 k Ω) MUN2230 (V_{CC} = 5.0 V , V_B = 0.25 V , R_L = 1.0 kΩ) MUN2215 MUN2216 MUN2233 MUN2240		V_{OH}	4.9	-	-	Vdc
Input Resistor	MUN2211	R_1	7.0	10	13	kΩ
	MUN2212		15.4	22	28.6	
	MUN2213		32.9	47	61.1	
	MUN2214		7.0	10	13	
	MUN2215		7.0	10	13	
	MUN2216		3.3	4.7	6.1	
	MUN2230		0.7	1.0	1.3	
	MUN2231		1.5	2.2	2.9	
	MUN2232		3.3	4.7	6.1	
	MUN2233		3.3	4.7	6.1	
	MUN2234		15.4	22	28.6	
	MUN2235		70	100	130	
	MUN2236		32.9	47	61.1	
	MUN2237		70	100	130	
	MUN2240		32.9	47	61.1	
	MUN2241		70	100	100	
Resistor Ratio	MUN2211/MUN2212/MUN2213 MUN2236	R_1/R_2	0.8	1.0	1.2	
	MUN2214		0.17	0.21	0.25	
	MUN2215/MUN2216/MUN2240 MUN2241		-	-	-	
	MUN2230/MUN2231/MUN2232		0.8	1.0	1.2	
	MUN2233		0.055	0.1	0.185	
	MUN2234		0.38	0.47	0.56	
	MUN2237		1.7	2.1	2.6	

1. Pulse Test: Pulse Width < 300 ms, Duty Cycle < 2.0%

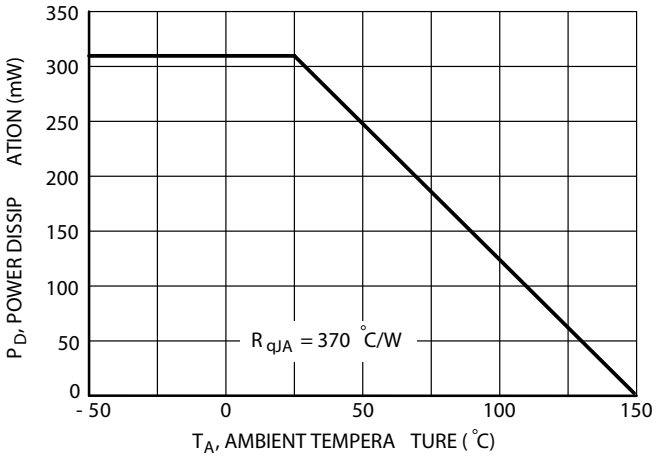


FIG 1. Derating Curve

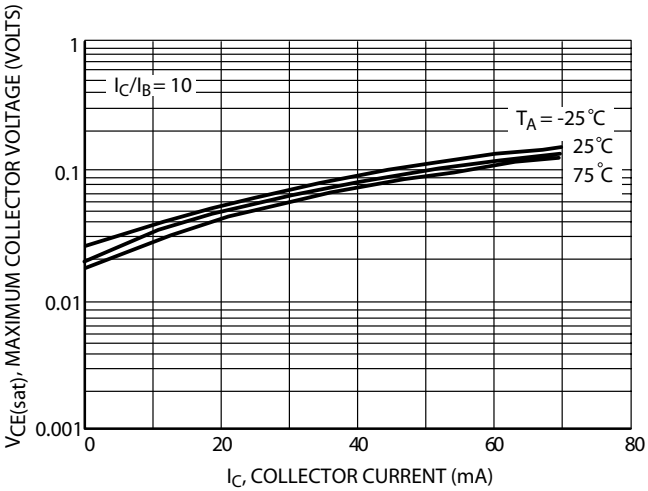


FIG2. $V_{CE(sat)}$ versus I_C

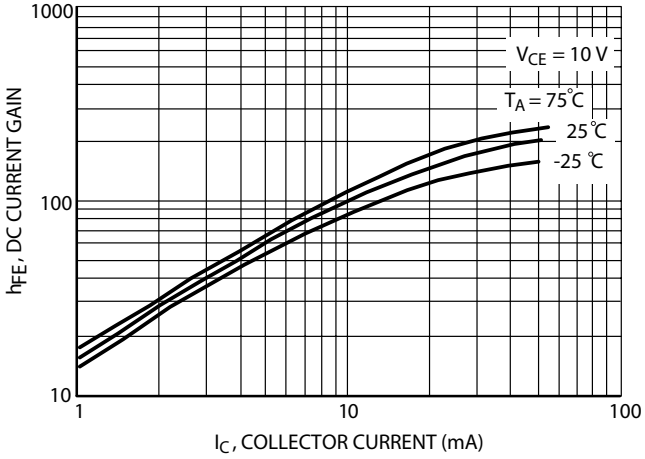


FIG3. DC Current Gain

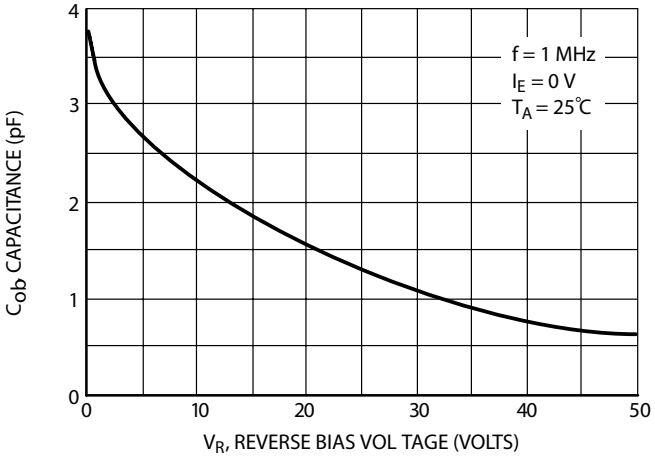


FIG4. Output Capacitance

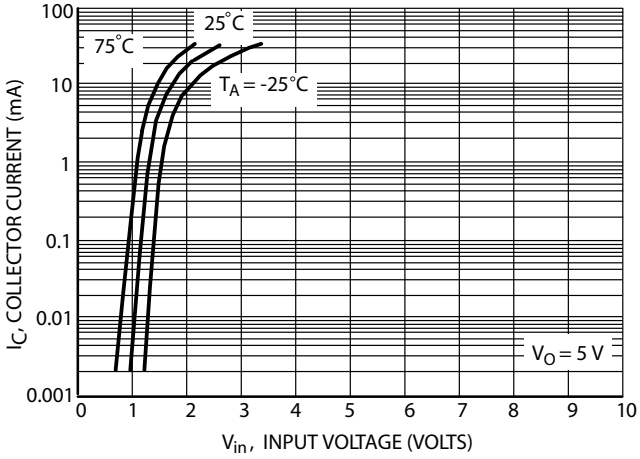


FIG5. Output Current versus Input Voltage

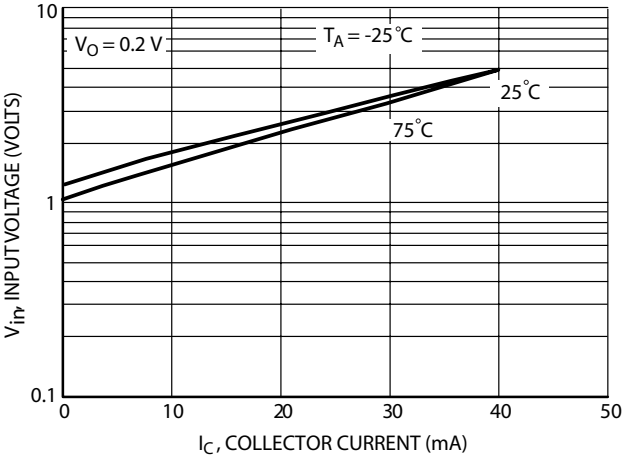


FIG6. Input Voltage versus Output Current

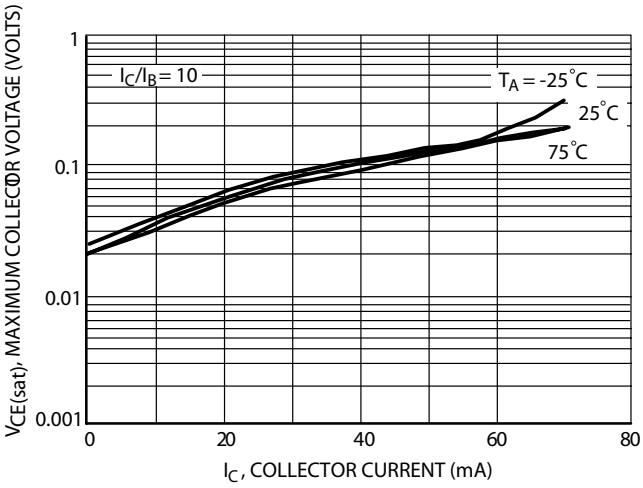


FIG. $V_{CE(sat)}$ versus I_C

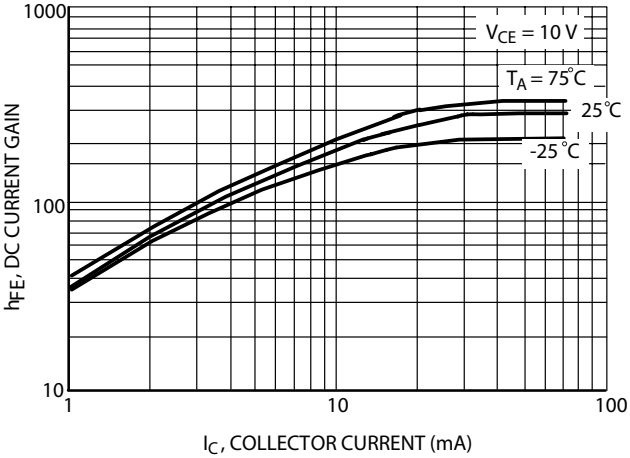


FIG8. DC Current Gain

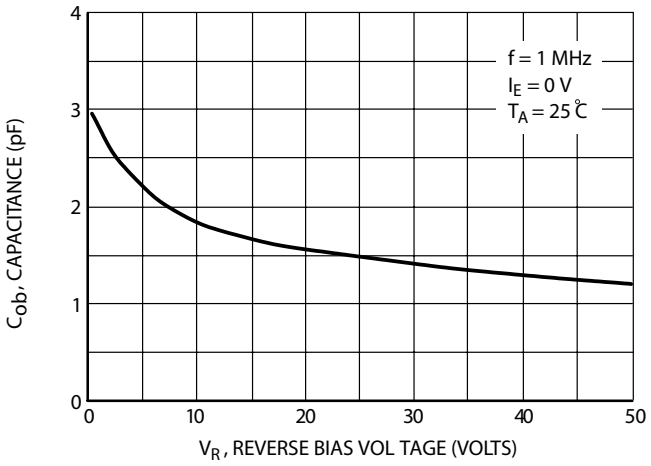


FIG9. Output Capacitance

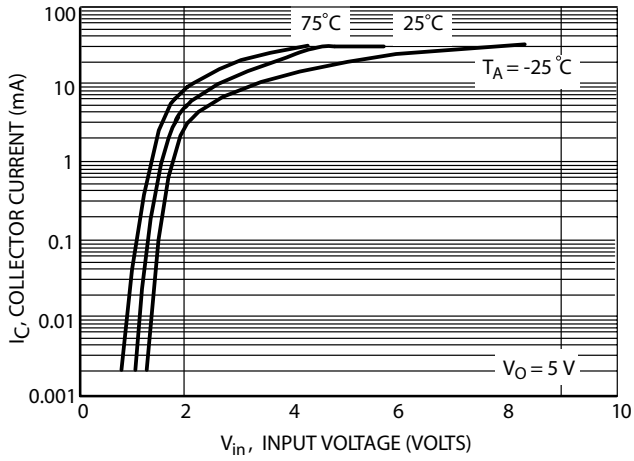


FIG10. Output Current versus Input Voltage

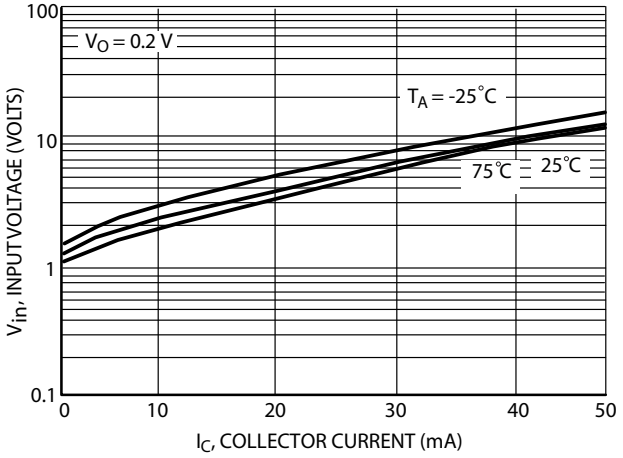


FIG11. Input Voltage versus Output Current

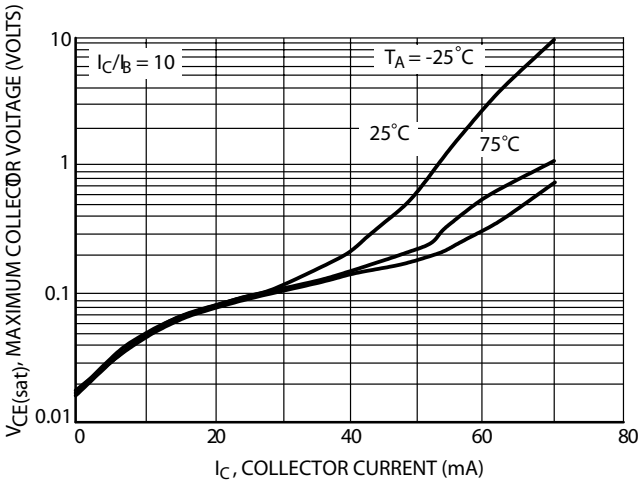


FIG12. $V_{CE(sat)}$ versus I_C

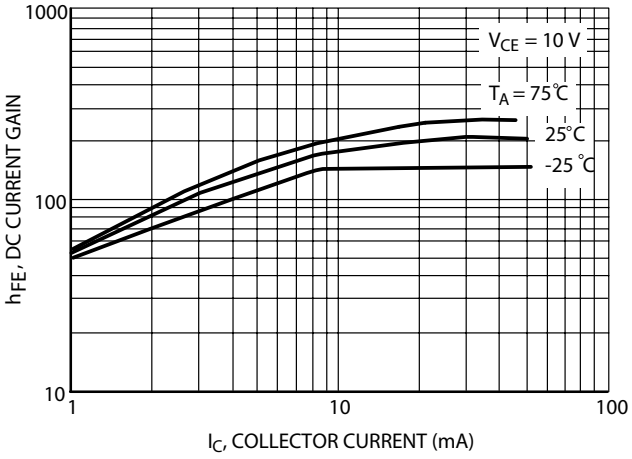


FIG13. DC Current Gain

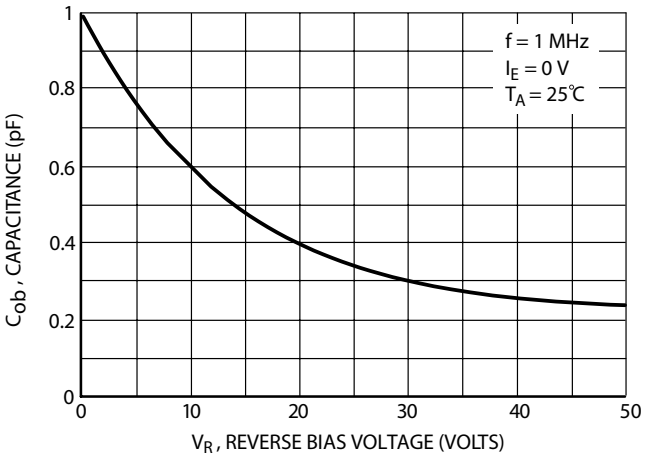


FIG14. Output Capacitance

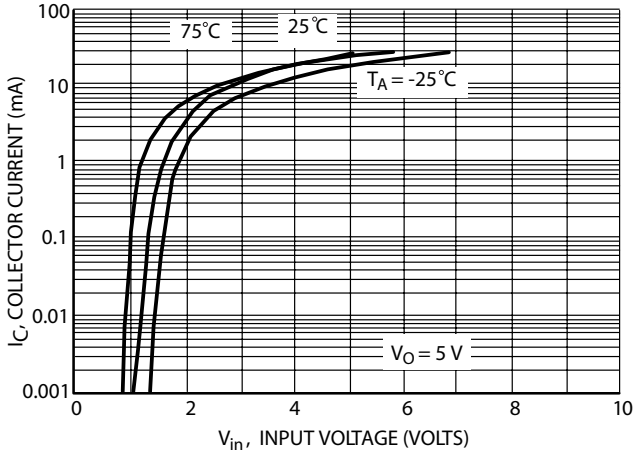


FIG15. Output Current versus Input Voltage

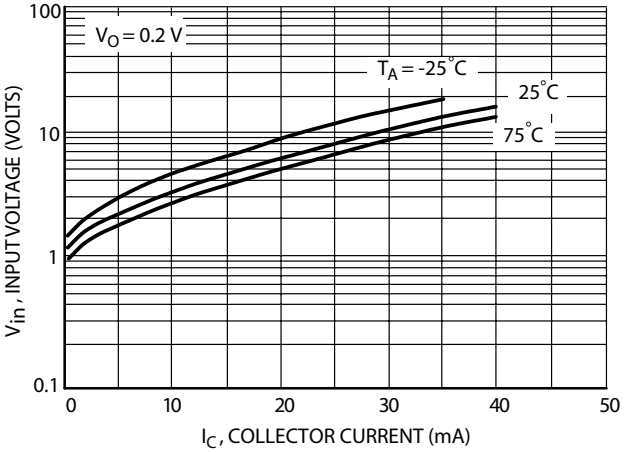


FIG16. Input Voltage versus Output Current

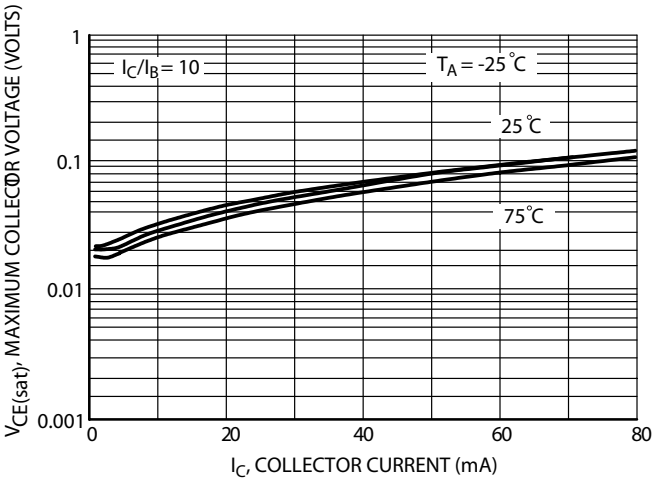


FIG17. $V_{CE(sat)}$ versus I_C

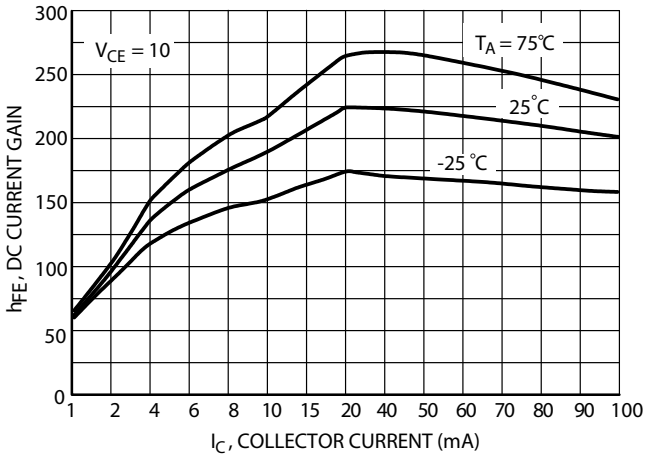


FIG18. DC Current Gain

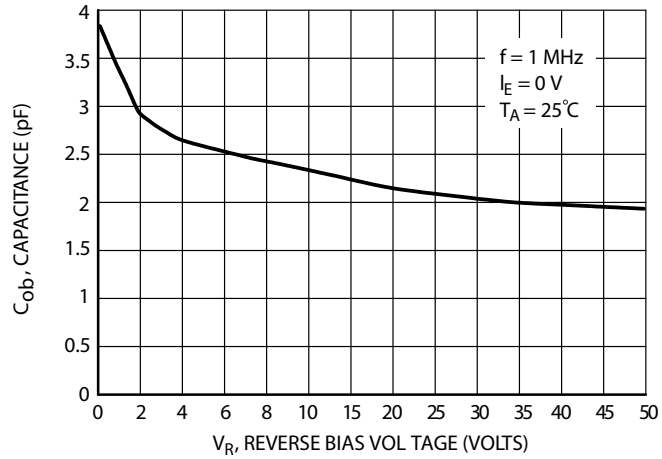


FIG19. Output Capacitance

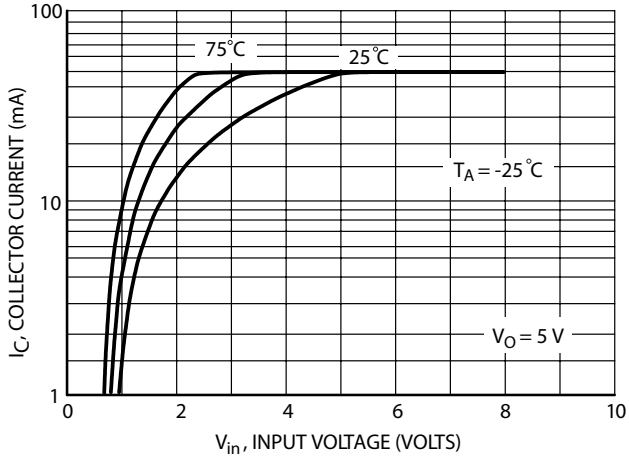


FIG20. Output Current versus Input Voltage

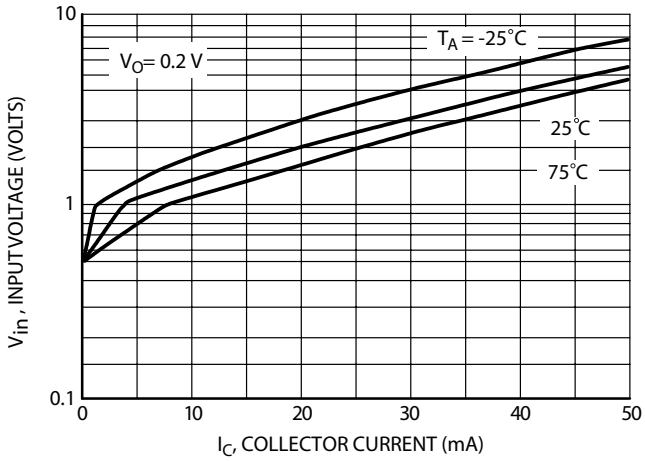


FIG21. Input Voltage versus Output Current

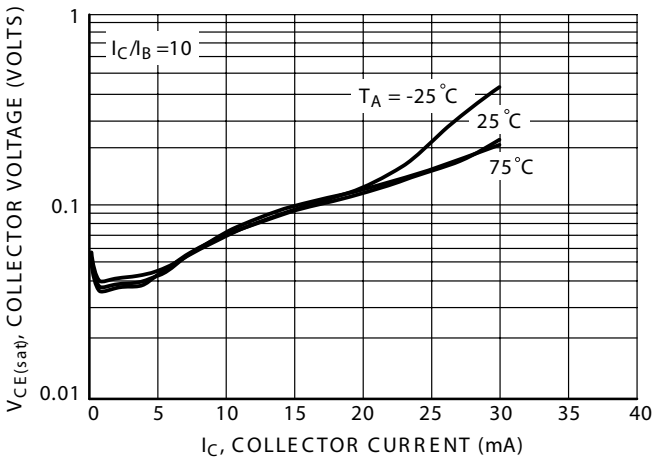


FIG22. $V_{CE(sat)}$ versus I_C

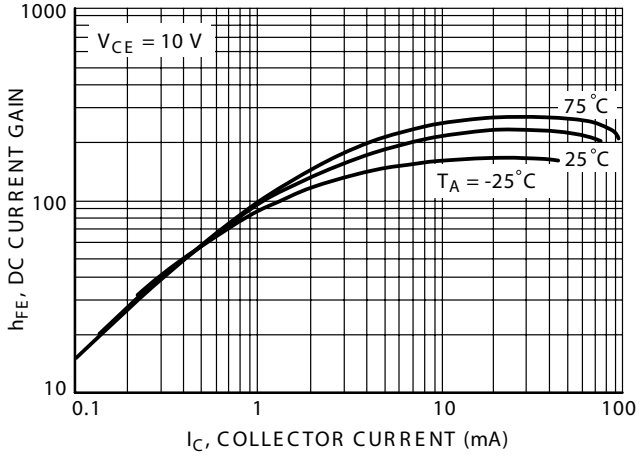


FIG23. DC Current Gain

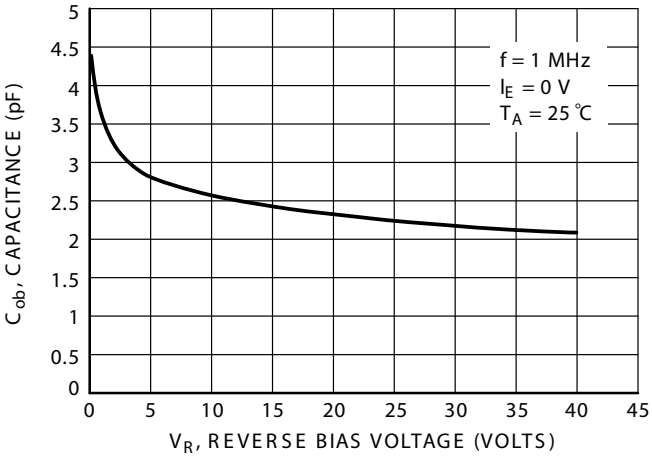


FIG24. Output Capacitance

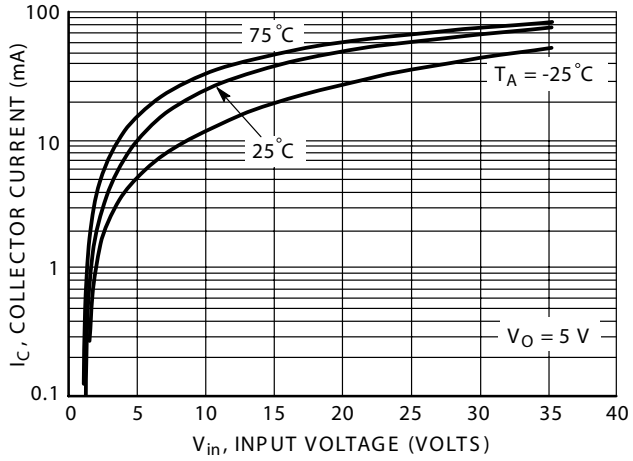


FIG25. Output Current versus Input Voltage

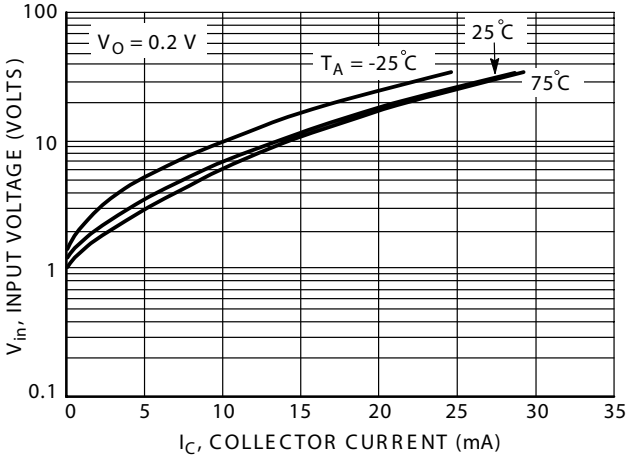


FIG26. Input Voltage versus Output Current

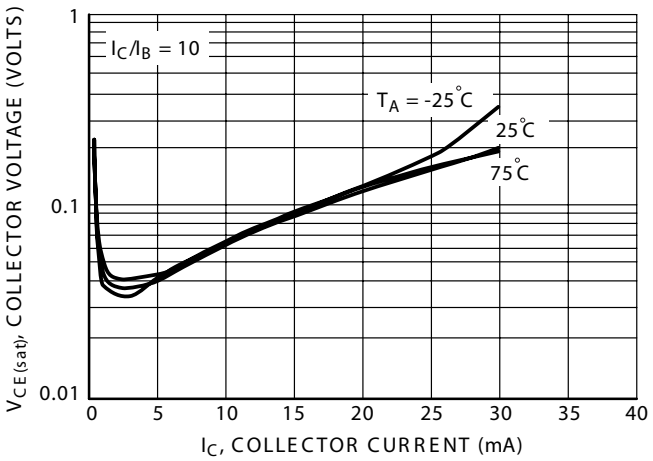


FIG27. $V_{CE(sat)}$ versus I_C

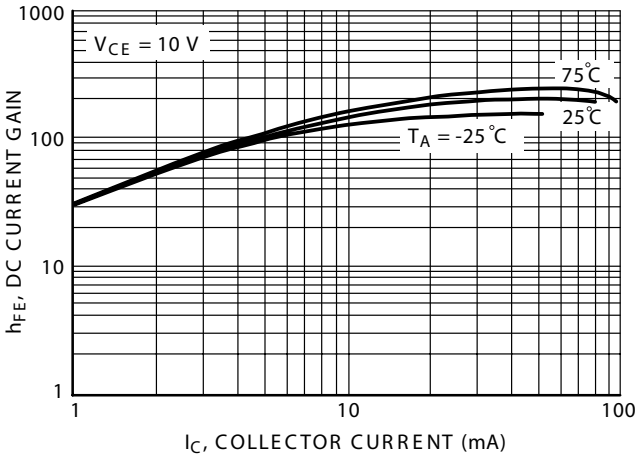


FIG28. DC Current Gain

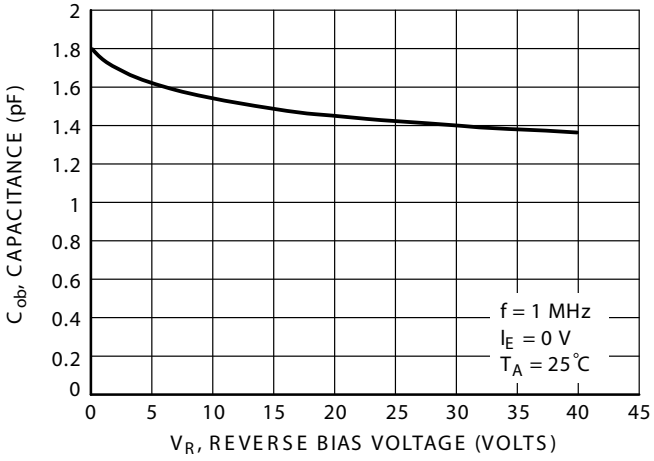


FIG29. Output Capacitance

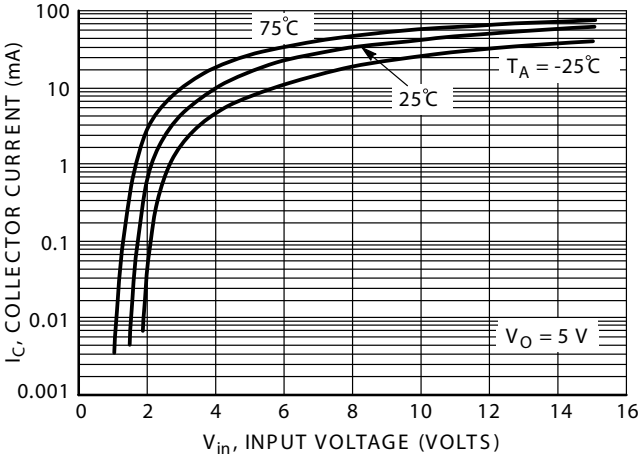


FIG30. Output Current versus Input Voltage

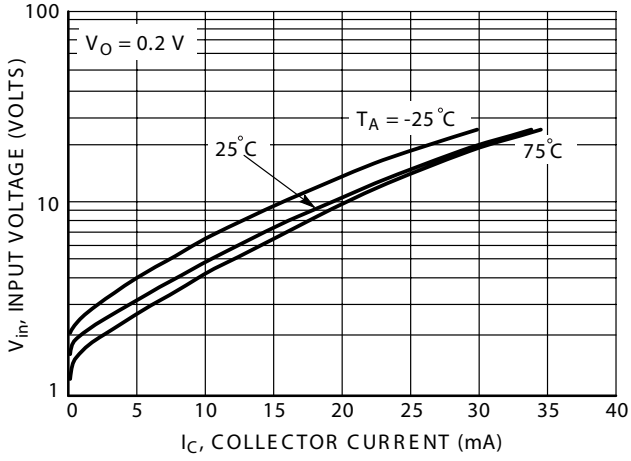


FIG31. Input Voltage versus Output Current

TYPICAL APPLICATIONS FOR NPN BRTs

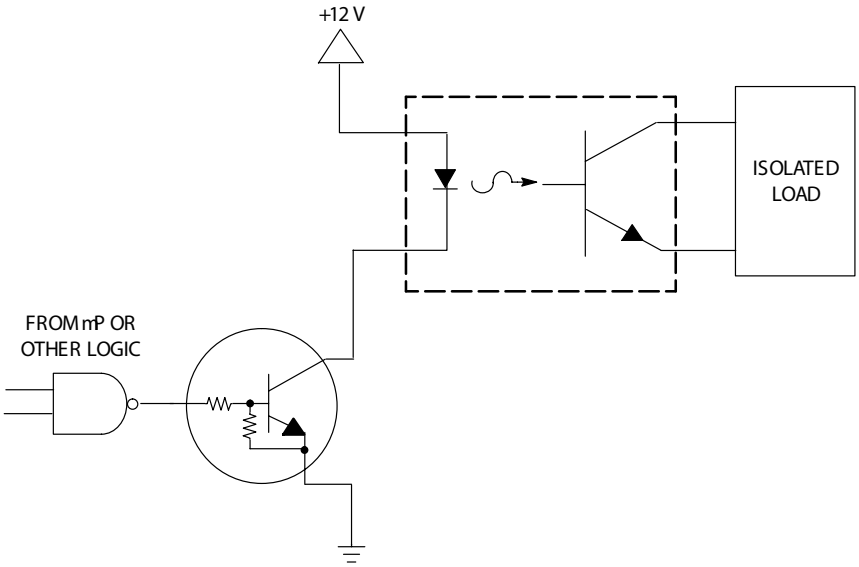


FIG32. Level Shifter: Connects 12 or 24 Volt Circuits to Logic

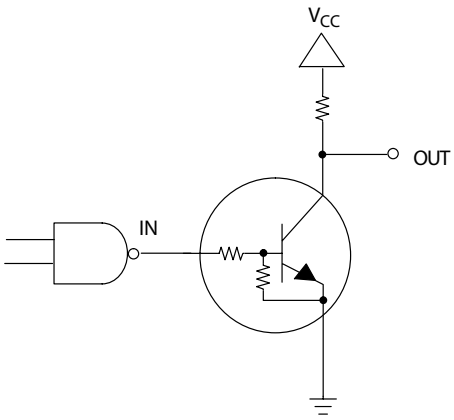


FIG33. Open Collector Inverter: Inverts the Input Signal

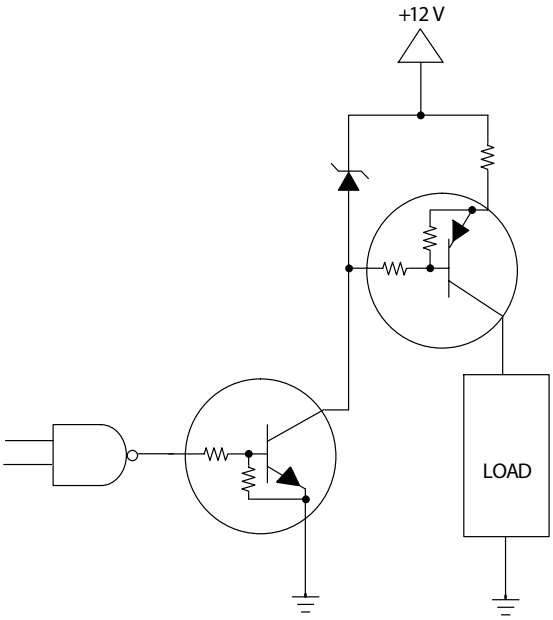
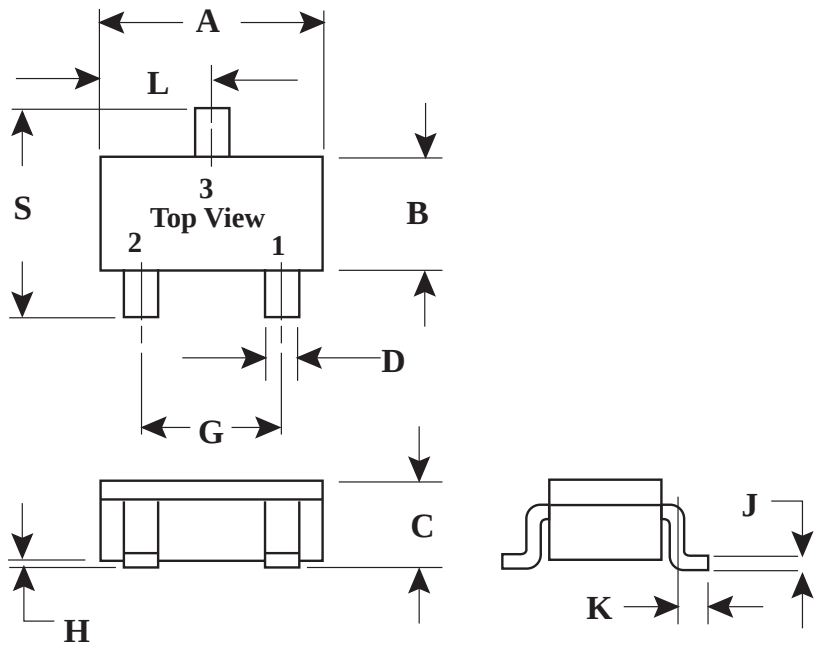


FIG34. Inexpensive, Unregulated Current Source

SC-59 Outline Dimension



SC-59		
Dim	**Min**	**Max**
A	2.70	3.10
B	1.30	1.70
C	1.00	1.30
D	0.35	0.50
G	1.70	2.30
H	0.00	0.10
J	0.10	0.26
K	0.20	0.60
L	1.25	1.65
S	2.25	3.00
All Dimension in mm		